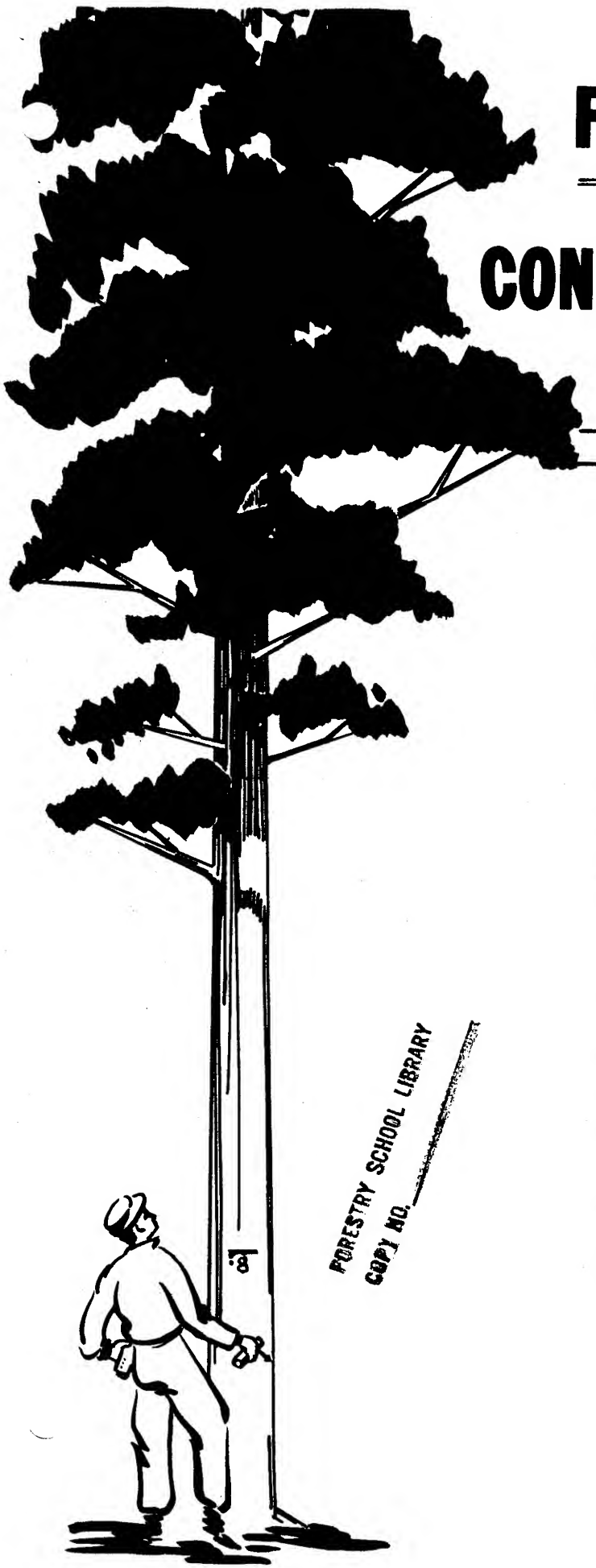


FOREST CONTROL *by* CONTINUOUS INVENTORY

"Today I have grown taller from walking with the trees."
...Karle Wilson

Milwaukee, Wis. May, 1962 No. 98

VOLUNTARY COOPERATION

Voluntary cooperation means nothing to the dictator; he inforces involuntary compliance. Voluntary cooperation means much to the skilled administrator; he develops it by ethical methods. Cooperation means joint action; mutuality of interest. It implies participation as equals, willingness to compromise, readiness to make concessions for reciprocal advantage. Cooperation and compulsion are mutually exclusive and antagonistic. Compulsion suppresses freedom of expression, inhibits voluntary response, arouses hostility and secret opposition.

Enlightened methods of directing human effort are relegating compulsion to the limbo of the outmoded and obsolescent together with its passive resistance, superficial compliance, and grudging obedience. Patience and persuasion rather than pugnacity and parade of power, are gaining wider recognition as more effective agents in promoting better individual morale, improved performance, and greater esprit de corps. Cooperation consistently practiced, enables an administrator to project his plans and policies throughout his entire organization and assure for them acceptance and loyal support.

Taken from the booklet,
AS I SEE IT; OBSERVATIONS OF
A CIVIL SERVANT. 1941
Warner W. Stockberger, PH.D.

CAL STOTT

The Forester

A NEW SCRIBNER BOARD FOOT FORMULA FOR CALCULATING INDIVIDUAL TREE VOLUMES

It has long been a purpose of our individual tree volume calculations in CFI, to conform as closely as possible to Suren R. Gevorkiantz' original Region 9 composite volume tables. His early board foot tables in particular seem well suited to the timber of the North Central Region, and we have constantly sought for formulas which would most closely agree with these tables. This has now been accomplished beyond our fondest hope with a new Scribner board foot formula by Thomas A. Jones of the Kimberly-Clark Corporation, Neenah, Wisconsin.

Tom Jones' formula is long, which accounts for its close adherence to the base volume table, but it is a far simpler formula than it would appear to be at the first startled glance. At any rate, the size of the formula is unimportant to the larger computers with which it is used, and the program once prepared, can be used over and over again. Those who accept the basic composite volume table concept will be very pleased with the new formula to be used in the medium and large size computers.

Tabular comparisons of the original composite table and the new formula volumes are given in detail. If the tabulations are closely examined, it will be noticed that the volumes in every length and diameter class show remarkable agreement.

Comparisons of the new formula volumes and the original CFI formula volumes are also given. They show reasonable correlation throughout, but with obvious variation trends in the small and large diameter classes. The curved comparisons for 2110 trees are close and the direction and extent of the variations clear.

Also presented with this Newsletter is a table of test values for direct comparison with computed results, and for test deck use. Those who are planning work with the new Tom Jones' formula will find this issue a ready and useful reference.

CAL STOTT
Forester

FORMULA FOR COMPUTING THE SCRIBNER VOLUME OF SAWLOG TREES

EXHIBIT VI

BASIS: Bulletin 1104. Composite Volume Tables for Timber and Their Application in the Lake States. S. R. Gevorkiantz and L. P. Olsen, Lake States Forest Experiment Station, Forest Service.

THE FORMULA

$$V_s = \left[a + \sum_{i=1}^{10} b_i x_i\right] (SP_f) (So_f)$$

IN WHICH

V_s = Volume scribner

a = Constant +5.527,702

$\left\{\sum_{i=1}^{10} b_i x_i\right\}$ Algebraic sum of the products of 10 constants and 10 variables

b_i = The 10 constants

x_i = The 10 variables

SP_f = Species variation factor

So_f = Soundness factor

LIST OF THE 10 CONSTANTS AND 10 VARIABLES

b_i CONSTANTS		x_i VARIABLES	
a = +5.527 702			
1. b_1 = -4.224 356	multiplied by	V_c	(Volume of truncated cone)
2. b_2 = -2.408 250	multiplied by	D	(DBH)
3. b_3 = + .675 898	multiplied by	H	(Usable Length)
4. b_4 = + .026 424,1	multiplied by	D^2H	
5. b_5 = - .007 515,13	multiplied by	H^2	
6. b_6 = - .006 047,62	multiplied by	Vc^2	
7. b_7 = + .291 865	multiplied by	D^2	
8. b_8 = + .000 078 301,2	multiplied by	D^2H^2	
9. b_9 = - .000 000 773 561	multiplied by	D^2H^3	
10. b_{10} = + .000 000 020 484,3	multiplied by	D^4H^2	

DEVELOPMENT OF VOLUME OF TRUNCATED CONE (Vc)

$$Vc = H(.134463 + .375\,246\,R + 1.047198\,R^2)$$

IN WHICH

$$R = \left(.358333 + \frac{H\left(\frac{D}{24} - .358\,333\right)}{H - 3.5}\right)$$

THE FINAL FORMULA IN DETAIL

$$V_s = (a + b_1V_c + b_2D + b_3H + b_4D^2H + b_5H^2 + b_6V_c^2 + b_7D^2 + b_8D^2H^2 + b_9D^2H^3 + b_{10}D^4H^2)\,(SP_f)\,(So_f)$$

Thomas A. Jones
Development Assistant to the Manager
Central Planning Department
Kimberly-Clark Corporation, Neenah, Wis.

VOLUME COMPARISON
SCRIBNER BOARD FOOT LOG SCALE AND FORMULA

EXHIBIT VII

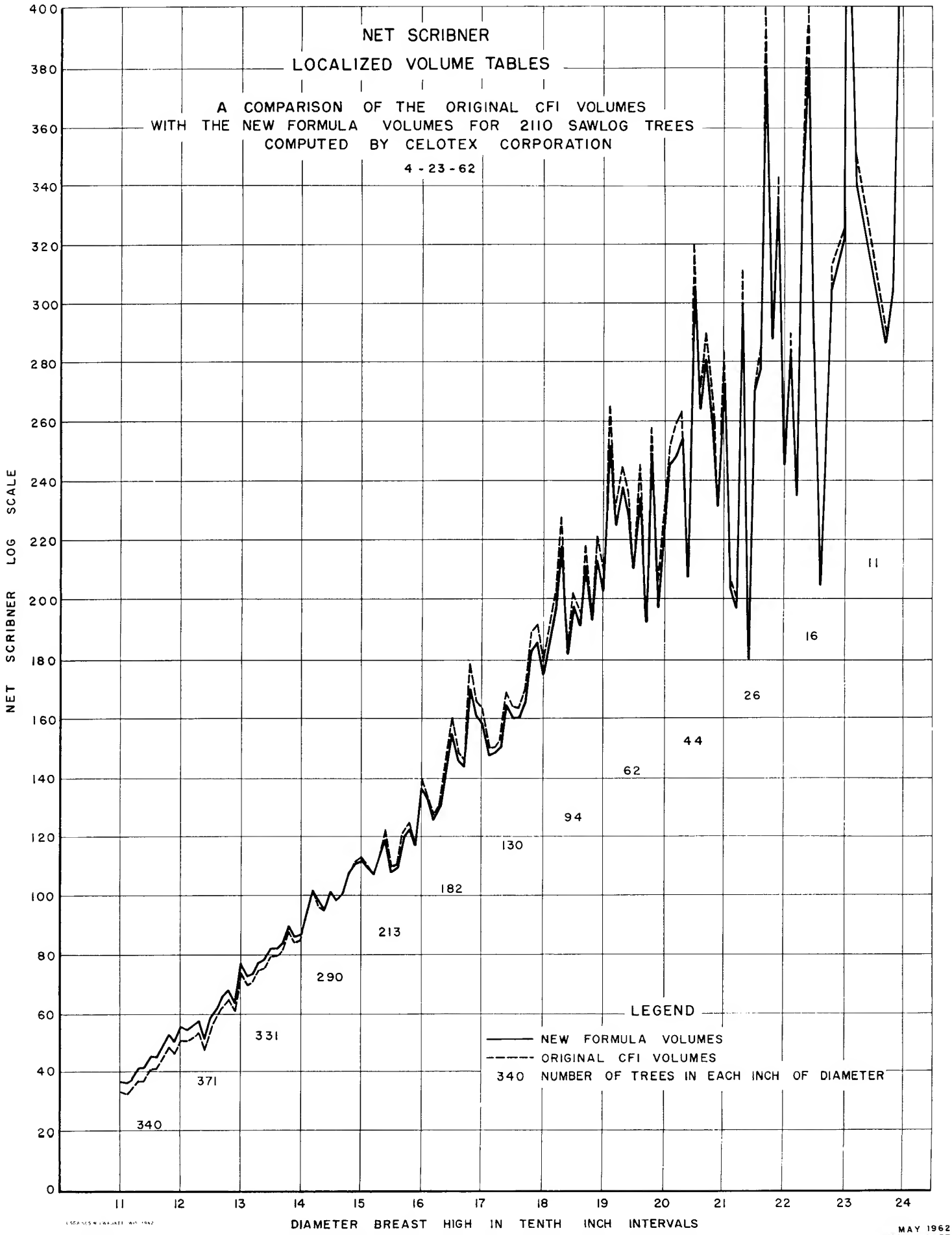
DBH	Source	1/2 8'	1 16'	1-1/2 24'	2 32'	2-1/2 40'	3 48'	3-1/2 56'	4 64'
10	Formula	19	30	39	48	56	62		
	Bul. 1104	17	30	40	49	57	62		
12	Formula	29	47	63	78	92	104	115	
	Bul. 1104	28	48	66	78	89	100	108	
14	Formula	41	68	92	115	136	156	174	188
	Bul. 1104	40	70	96	116	141	160	170	178
16	Formula	56	94	126	158	188	217	242	265
	Bul. 1104	54	93	129	158	191	224	248	263
18	Formula	73	123	166	208	248	286	322	353
	Bul. 1104	72	122	168	207	248	292	325	355
20	Formula	93	157	212	265	317	366	411	452
	Bul. 1104	90	156	212	262	317	366	415	450
22	Formula	115	194	262	329	393	454	511	563
	Bul. 1104	111	194	262	328	392	450	510	560
24	Formula	139	236	318	398	476	551	621	684
	Bul. 1104	137	236	319	400	470	550	620	690
26	Formula	165	281	379	475	568	657	740	817
	Bul. 1104	165	281	381	480	565	650	740	820
28	Formula	194	331	446	558	667	771	870	960
	Bul. 1104	195	331	450	560	670	760	860	960
30	Formula	224	384	518	647	773	894	1009	1114
	Bul. 1104	227	383	520	650	770	890	1000	1110
32	Formula	257	441	594	743	887	1026	1157	1278
	Bul. 1104	260	440	600	740	890	1020	1150	1280
34	Formula	292	502	676	844	1008	1166	1315	1453
	Bul. 1104	294	500	680	840	1010	1160	1300	1460
36	Formula	329	567	762	952	1137	1314	1482	1637
	Bul. 1104	330	565	770	960	1140	1310	1480	1650
38	Formula	367	635	854	1066	1272	1470	1658	1832
	Bul. 1104	365	630	860	1070	1270	1470	1660	1840
40	Formula	407	706	950	1185	1414	1635	1843	2035
	Bul. 1104	405	700	950	1180	1400	1630	1850	2050

Bulletin 1104, Published by the Lake States Forest Experiment Station, Forest Service. Written by S. R. Gevorkiantz and L. P. Olsen.

DEVIATIONS OF FORMULA VOLUMES FROM BULLETIN 1104
SCRIBNER BOARD FOOT LOG SCALE

EXHIBIT VIII

DBH	Deviations in Volume and Percent	1/2	1	1-1/2	2	2-1/2	3	3-1/2	4
		8'	16'	24'	32'	40'	48'	56'	64'
10	Bd. Ft.	2	0	-1	-1	-1			
	Percent	+11.8%	0	-2.5%	-2.0%	-1.8%			
12	Bd. Ft.	1	-1	-3	0	3	4	7	
	Percent	+3.6%	-2.1%	-4.5%	0	+3.4%	+4%	+6.5%	
14	Bd. Ft.	1	-2	-4	-1	-5	-4	4	10
	Percent	+2.5%	-2.9%	-4.2%	-0.9%	-3.5%	-2.5%	+2.4%	+5.6%
16	Bd. Ft.	2	1	-3	0	-3	-7	-6	2
	Percent	+3.7%	+1.1%	-2.3%	0	-1.6%	-3.1%	-2.4%	+0.8%
18	Bd. Ft.	1	1	-1	1	0	-6	-3	-2
	Percent	+1.4%	+0.8%	-1.2%	+0.5%	0	-2.1%	+0.9%	+0.5%
20	Bd. Ft.	3	1	0	3	0	0	-4	+2
	Percent	+3.3%	+0.6%	0	+1.1%	0	0	-1.0%	+0.4%
22	Bd. Ft.	4	0	0	1	1	4	1	3
	Percent	+3.6%	0	0	+0.3%	+0.3%	+0.9%	+0.2%	+0.5%
24	Bd. Ft.	2	0	-1	-2	6	1	1	-6
	Percent	+1.5%	0	-0.3%	-0.5%	+1.3%	+0.2%	+0.2%	-0.9%
26	Bd. Ft.	0	0	-2	-5	3	7	0	-3
	Percent	0	0	-0.5%	-1.0%	+0.5%	+1.1%	0	-0.4%
28	Bd. Ft.	-1	0	-4	-2	-3	11	10	0
	Percent	-0.5%	0	-0.9%	-0.4%	-0.4%	+1.4%	+1.2%	0
30	Bd. Ft.	-3	1	-2	-3	3	4	9	4
	Percent	-1.3%	+0.3%	-0.4%	-0.5%	-0.4%	+0.4%	+0.9%	+0.4%
32	Bd. Ft.	-3	1	-6	3	-3	6	7	-2
	Percent	-1.2%	+0.2%	-1.0%	+0.4%	-0.3%	+0.6%	+0.6%	-0.2%
34	Bd. Ft.	-2	2	-4	4	-2	6	15	-7
	Percent	-0.7%	+0.4%	-0.6%	+0.5%	-0.2%	+0.5%	+1.2%	-0.5%
36	Bd. Ft.	-1	2	-8	-8	-3	4	2	-13
	Percent	-0.3%	+0.4%	-1.0%	-0.8%	-0.3%	+0.3%	+0.1%	-0.8%
38	Bd. Ft.	2	5	-6	-4	2	0	-2	-8
	Percent	+0.5%	+0.8%	-0.7%	-0.4%	-0.2%	0	-0.1%	-0.4%
40	Bd. Ft.	2	6	0	5	14	5	-7	-15
	Percent	+0.5%	+0.9%	0	+0.4%	+1.0%	+0.3%	-0.4%	-0.7%


NET SCRIBNER
LOCALIZED VOLUME TABLES
A COMPARISON OF THE ORIGINAL CFI VOLUMES
WITH THE NEW FORMULA VOLUMES FOR 2110 SAWLOG TREES
COMPUTED BY CELOTEX CORPORATION
4-23-62
NET SCRIBNER LOG SCALE
DIAMETER BREAST HIGH IN TENTH INCH INTERVALS
LEGEND
NEW FORMULA VOLUMES
ORIGINAL CFI VOLUMES
340 NUMBER OF TREES IN EACH INCH OF DIAMETER
340
371
331
290
213
182
130
94
62
44
26
16
11

MAY 1962

VOLUMES PER TREE COMPUTED WITH THE NEW SCRIBNER FORMULA AND COMPARED WITH OTHER SOURCE DATA

DBH	USABLE LENGTH	SPECIES FACTOR	SOUND-NESS FACTOR	NET SCRIBNER BOARD FOOT VOLUMES PER TREE FROM: NEW FORMULA	BULLETIN 1104	ORIGINAL CFI FORMULA
11.0	24	1.0	.86	43.6	43.9	38.3
12.0	32	1.0	.97	75.8	75.7	70.6
13.0	32	1.0	.97	92.7	93.1	90.0
14.0	16	1.0	.86	58.7	60.2	55.4
14.0	40.	1.0	.78	106.2	110.0	108.7
15.0	40	1.0	.65	104.8	107.9	108.6
16.0	32	1.0	.78	123.5	123.2	125.3
16.0	40	1.0	.78	147.0	149.0	153.0
17.0	16	1.0	.65	70.2	68.9	67.4
17.0	48	1.0	.86	215.4	221.0	230.9
18.0	40	1.0	.86	213.8	213.3	223.1
19.0	32	1.0	.78	184.0	182.5	187.6
20.0	24	1.0	.78	165.2	165.4	164.8
21.0	32	1.0	.86	254.6	252.0	258.5
21.0	40	1.0	.86	304.2	301.9	314.4
23.0	24	1.0	.97	281.1	281.3	279.6
				2440.8	2449.3	2476.2
Deviation in percent					+0.3%	+3.5%

Tree dimensions and volume answers given in this table may be used for checking answers computed with the new Scribner board foot volume formula. It is necessary only to search out trees of corresponding dimension in listings of results computed with the new formula and compare them with these pre-computed table values. There should be perfect agreement. Original CFI formula volume answers are tabulated merely for comparison with the new formula answers.

Tree dimensions in this table may also be made up into a series of test decks for trial runs through medium and large-sized computers or through the calculating punch.